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ITU-T

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**ALPHABETICAL TELEGRAPH TERMINAL
EQUIPMENT**

**USE OF THE TELEX NETWORK FOR DATA
TRANSMISSION AT 50 BAUDS**

ITU-T Recommendation S.15

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation S.15 was published in Fascicle VII.1 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Recommendation S.15

USE OF THE TELEX NETWORK FOR DATA TRANSMISSION AT 50 BAUDS

(former Recommendation V.10, Geneva, 1964; amended at Mar del Plata, 1968)

The CCITT,

considering

(a) that the telex network is well adapted for the economical transmission of data at fairly slow speeds, for the equipment required for binary transmission of data by telex stations, over and above the normal equipment, is relatively simple;

(b) but that some limits have to be imposed on data transmission codes used in the telex network because of:

- the need to make sure that telex calls will not be abruptly released;
- exaggerated distortion that may be introduced by amplitude-modulation voice-frequency telegraph systems when an excessively long-duration start (condition A) modulation element appears in a signal;
- the fact that in some networks there is regenerative repetition of start-stop signals, which can be handled only as if they were constructed like five-unit start-stop information signals;
- the possibility that certain long-distance calls may be established over synchronous systems that can handle only five-unit start-stop signals;

(c) that the limitation due to regenerative repeaters and synchronous systems imposes the use of a five-unit start-stop code for information, hence § 1 of the Recommendation (the more general procedure) deals with data transmission with a five-unit code on start-stop systems. But in certain circumstances alphabets with more than five units can be used for data transmission; hence § 2 of the Recommendation,

unanimously declares the following view:

1 Data transmission with a five-unit code on start-stop systems

1.1 Telex calls for data transmission may be set up in the international telex network, subject to the following provisions:

1.2 The call shall be set up between the caller and the called subscriber in accordance with the procedure recommended for the setting-up of a telex call and its supervision by exchange of answer-back codes (Recommendations F.60 [1] and U.1 [2]).

1.3 When one of the subscribers concerned wishes to introduce data transmission equipment into the connection, he shall transmit the sequence SSSS (or ''') of combination No. 19 from International Telegraph Alphabet No. 2 (signal for transfer to data). Upon reception of this sequence of combinations, the data transmission or reception equipment, as the case may be, shall be connected to the line. This changeover to the data position may be effected:

- a) manually at both terminals;
- b) automatically at both terminals;
- c) manually at one terminal and automatically at the other.

In order to avoid any misunderstanding between the stations concerned, the calling operator should first check the equipment of the distant station (whether manual changeover or automatic changeover).

1.3.1 *Manual changeover at both terminals*

1.3.1.1 Once the connection has been set up, the following procedure should be followed.

1.3.1.2 The operator of the calling station sends the sequence of four combinations No. 19. This sequence should not connect the data equipment locally.

1.3.1.3 Upon reception of the **SSSS** (or ''') sequence, the operator of the called station likewise sends the sequence of four combinations No. 19, and then connects his data equipment to the line.

1.3.1.4 Upon reception of this answer sequence, the calling operator connects his data equipment to the line.

1.3.2 *Automatic changeover at both terminals*

1.3.2.1 Once the connection has been set up, the following procedure should be followed:

1.3.2.2 The calling station sends the sequence of four combinations No. 19 and must connect its data equipment to the line automatically within less than 500 milliseconds, starting from the end of transmission of the last signal of this sequence.

1.3.2.3 Reception of the sequence at the other terminal of the connection connects the called station to the data equipment line automatically within less than 500 milliseconds, starting from the end of reception of the last signal of this sequence.

1.3.2.4 The data transmission should not commence before the end of the 500-millisecond delay.

1.3.3 *Calling station with manual changeover and called station with automatic changeover*

1.3.3.1 Once the connection has been set up, the following procedure is followed:

1.3.3.2 The operator of the calling station sends the sequence of four combinations No. 19, and then immediately connects his data equipment to the line.

1.3.3.3 Upon reception of the sequence of four combinations No. 19 at the called station, the data equipment must be connected to the line within less than 500 milliseconds, starting from the end of reception of this sequence.

1.3.3.4 The data signals should not be transmitted before the end of the 500-millisecond delay.

1.3.4 *Calling station with automatic changeover and called station with manual changeover*

1.3.4.1 Once the connection has been set up, the following procedure should be followed:

1.3.4.2 The calling station invites its called correspondent, by a brief preliminary message, to send the sequence of four combinations No. 19. This message must not include within itself the sequence of four combinations No. 19. If the calling station is not equipped with a teleprinter attended by an operator, this preliminary message must be sent automatically.

1.3.4.3 The operator of the called station then sends the sequence of four combinations No. 19 and immediately connects his data equipment to the line.

1.3.4.4 Upon reception of this sequence at the calling station, connection of the data equipment to the line must be effected within less than 500 milliseconds, starting from the end of reception of the last combination No. 19 of the sequence.

1.3.4.5 Transmission of the data signals should not begin before the end of the 500-millisecond delay.

Note - The arrangements envisaged throughout § 1.3 above run counter to the inclusion of the sequence of four combinations No. 19 in the answer-back code of telex lines equipped with a simulator and at the same time in the answer-back of teleprinters equipped with an automatic device for changeover to data transmission. (This fact should be borne in mind in the further study of this Recommendation.)

- 1.4 The sequence of four combinations No. 19 will make ineffective, where necessary:
- devices that might conceivably emit signals disturbing to data transmissions, in particular the answer-back or, possibly, the delay signal used in connection with error-correcting synchronous radio systems (Recommendation U.22 [3]);
 - devices that might be falsely operated by data signals, such as devices for operator-recall (Recommendation U.21 [4]).

1.5 Data transmission should be made by means of start-stop formed according to the structure of International Telegraph Alphabet No. 2 (ITA2). Users should be left free to decide how combinations should be allocated to the various components of the alphabet (of course ITA2 itself may be used).

1.6 When error control is necessary, one of the following methods of error control may be used:

- return of information to the transmitting station (information feedback system);
- block transmission with check characters at the end of the block;
- character-by-character transmission with check bits (in the case of five-unit signals with redundancy).

1.7 Unless the exception stated in § 1.8 below is employed at the end of the data transmission, the telex clearing signal described in Recommendation U.1 [2] shall be emitted. This will cause the call to be cleared down and the terminal equipment to return to the telex position, and will cause the devices that might have been rendered inoperative on certain special circuits (see § 1.4 above) to go back to normal. This clearing signal must set off the clear-confirmation (see Recommendation U.1 [2]).

Note - Users may expect that some combinations No. 32, possibly followed by other combinations, may be received before the connection is cleared.

1.8 As soon as the telex connection has been transferred to the data transmission equipment, the transmission must be controlled by the data equipment at each terminal. If it is useful, for some reason, to return to telex operation, the data terminal equipment must control the transfer back to telex. This possibility of returning to the telex condition is used by a subscriber who considers it useful, after a data transmission, to return to teleprinter operation for a telex connection, instead of sending the clearing signal as mentioned in § 1.7 above. This return should be accompanied by the re-entry into service of the answer-back device. This control may be caused:

- a) by the transmission of a special data signal over the line, causing the receiving installation to return to the telex position. The received data terminal equipment must send the same signal in the reverse direction to the opposite terminal before it causes transfer to the telex condition. This mutual signalling identifies the situations at the two terminals;
- b) by a local control causing return to the telex situation, set off if no data or supervisory signal is transmitted or received during a given time interval agreed upon by the users.

Note - Telex connections that include error-correcting synchronous radio systems often insert long pauses into the message and due attention should be paid to this in selecting the agreed interval.

For these control operations, a special circuit should be set aside in the interface connecting the data terminal equipment to the transfer device.

Note - The provisions of § 1.8 above could be applied with advantage to the case of telex lines not equipped with teleprinter equipment but simply with answer-back unit simulators.

1.9 The signals transmitted by the data transmission devices must meet the requirements of §§ 1.1, 1.2, 1.3 and 2.1 in Recommendation S.3. The receiving equipment of the data reception devices must meet the requirements of §§ 1.1, 1.2, 1.6 and 3.1 in Recommendation S.3.

2 Data transmission with codes different from the start-stop code of ITA2

2.1 The attention of Administrations is drawn to the fact that it is impossible to send signals other than those of a five-unit start-stop code over international connections via time-division multiplex sections specially designed for a five-unit code. However, telex connections for data transmission may be set up over such relations in the conditions set out in § 1 of this Recommendation for the transmission of messages composed of signals different from those of the five-unit start-stop code. A service of this nature may be obtained by regrouping the units of these signals in the form of five-unit signals. Such regrouping calls for the use of additional code converters at the sending and receiving terminals.

2.2 Between telex networks that can take signals different from those of the five-unit start-stop code (that is to say, when telex calls between such networks do not call for regenerative repeaters, or for certain synchronous systems that would clash with them), by agreement between the Administrations concerned, data transmission with data transmission alphabets using these signals may be made, subject to the following:

- a) Application of the procedure described under 1.2;
- b) Application of the procedure described under 1.3;
- c) Application of the procedure described under 1.4;
- d) Use of a code with a modulation rate of 50 bauds should avoid composition of signals having more than seven consecutive elements of start polarity. (This limit is imposed to avoid clearing the connection unexpectedly in the exchanges as well as not to introduce excessive distortion on AMVFT channels.) Data may be transmitted by start-stop, or isochronously;
- e) When error control is necessary, one of the following methods of error control may be used:
 - return of information to the transmission station (information feedback system);
 - block transmission with check characters at the end of the block;
 - character-by-character protection by means of a parity check or a constant ratio code, for example the seven-unit code standardized in Recommendation S.13 (International Telegraph Alphabet No. 3).

In all cases item d) above should be taken into consideration;

- f) Application of the procedure described under 1.7;
- g) Application of the procedure described under 1.8.

References

- [1] CCITT Recommendation *Operational provisions for the international telex service*, Rec. F.60.
- [2] CCITT Recommendation *Signalling conditions to be applied in the international telex service*, Rec. U.1.
- [3] CCITT Recommendation *Signals indicating delay in transmission on calls set up by means of synchronous systems with automatic error correction by repetition*, Rec. U.22.
- [4] CCITT Recommendation *Operator recall on a telex call set up on a radiotelegraph circuit*, Rec. U.21.